A Sustainability-quality Model

Condori Fernandez, O.N.; Lago, P.

2018

document version
Publisher's PDF, also known as Version of record

citation for published version (APA)
Condori Fernandez, O. N., & Lago, P. (2018). *A Sustainability-quality Model*. VU Technical Report.

A Software Sustainability-Quality Model

Nelly Condori Fernandez*†, Patricia Lago*
*Vrije Universiteit Amsterdam, The Netherlands
n.condori-fernandez@vu.nl, p.lago@vu.nl
†Universidade da Coruña, Spain
n.condori.fernandez@udc.es

I. The Model

The Sustainability-Quality model shown in Table I is the result of the work reported in [1]. The Table represents the first version (V0.1) of our model. It should be used as a guideline to check the applicability and coverage of the model in practice.

References

[1] N. Condori-Fernandez and P. Lago, "Characterizing the contribution of quality requirements to software sustainability," *Journal of systems and software*, vol. 137, pp. 289–305, Mar. 2018.

Table I: Sustainability-quality model (Grey cell= QA is part of the model; White cell= QA is not part of the model)

Characteristics	Attributes	Definition according to [1]	TECH	SOC	ENV	ECON
Compatibility	Co-existence	product can perform its functions efficiently while sharing environment and resources with other products.				
	Interoperability	a system can exchange information with other systems and use the information that has been exchanged.				
Context coverage	Context completeness	system can be used in all the specified contexts of use				
	Flexibility	system can be used in contexts beyond those initially specified in the requirements.				
Effectiveness	Effectiveness	accuracy and completeness with which users achieve specified goals.				
Efficiency	Efficiency	resources expended in relation to the accuracy and completeness with which users achieve goals.				
Freedom from risk	Economic risk mitigation	system mitigates the potential risk to financial status in the intended contexts of use.				
	Environmental risk mitigation	system mitigates the potential risk to property or the environment in the intended contexts of use.				
	Health and safety risk mitigation	system mitigates the potential risk to people in the intended contexts of use.				
Functional suitability	Functional appropriateness	the functions facilitate the accomplishment of specified tasks and objectives.				
	Functional correctness	system provides the correct results with the needed degree of precision.				
	Functional completeness	degree to which the set of functions covers all the specified tasks and user objectives.				
Maintainability	Modifiability	system can be effectively and efficiently modified without introducing defects or degrading existing product quality				
	Modularity	system is composed of components such that a change to one component has minimal impact on other components.				
	Reusability	an asset can be used in more than one system, or in building other assets				
	Testability	effectiveness and efficiency with which test criteria can be established for a system.				
Performance efficiency	Capacity	the maximum limits of a product or system parameter meet requirements.				
	Resource utilization	the amounts and types of resources used by a system, when performing its functions, meet requirements.				
	Time behaviour	response, processing times and throughput rates of a system, when performing its functions, meet requirements.				
Portability	Adaptability	system can effectively and efficiently be adapted for different or evolving hardware, software or usage environments.				
	Replaceability	product can be replaced by another specified software product for the same purpose in the same environment.				
Reliability	Availability	system is operational and accessible when required for use.				
	Fault tolerance	system operates as intended despite the presence of hardware or software faults.				
	Maturity	system meets needs for reliability under normal operation.				
	Recoverability	system can recover data affected and re-establish the desired state of the system is case of an interruption or a failure.				
Satisfaction	Trust	stakeholders has confidence that a product or system will behave as intended.				
	Usefulness	user is satisfied with their perceived achievement of pragmatic goals.				
Security	Accountability	actions of an entity can be traced uniquely to the entity.				
	Authenticity	the identity of a subject or resource can be proved to be the one claimed.				
	Confidentiality	system ensures that data are accessible only to those authorized to have access.				
	Integrity	system prevents unauthorized access to, or modification of, computer programs or data.				
Usability	Appropriateness recognizability	users can recognize whether a system is appropriate for their needs, even before it is implemented.				
	Learnability	system can be used to achieve specified goals of learning to use the system.				
	Operability	system has attributes that make it easy to operate and control.				
	User error protection	system protects users against making errors.				
Accessibility	Accessibility	system can be used by people with the widest range of characteristics and capabilities.				
Robustness	Robustness	Refers to the capability of the sytem to behave in an acceptable way in unexpected situations				
Survivability	Survivability	The degree to which a system continues to fulfil its mission by providing essential services in a timely manner in spite of the presence of attacks				